MUSCLE STRENGTH, BALANCE AND FUNCTIONAL INDEPENDENCE IN PERSONS WITH STROKE

Fernandes, B.¹, Batista, F.², Beckert, P.², Evangelista, I.², Ferreira, M.J.², Prates, L.², Silveira Sérgio, J.¹
1 Lisbon Polytechnic Higher School of Health Technology, Lisboa, Portugal, 2 Hospital Fernando Fonseca, Amadora, Portugal,

Introduction
Cerebral vascular disease is one of the main causes of morbidity, disability and mortality in developed countries. Problems with movement control are frequent after stroke. Lower limb weakness and impaired balance are common problems that are related with the risk of falls and are likely to interfere with the ability to perform daily life activities. Physiotherapy intervention usually starts early after stroke and addresses impairments related to movement and posture in order to improve motor recovery and restore function.

Purpose
To investigate the relationship between knee muscle strength, balance and functional independence within the first month after stroke.

Participants
Subjects were recruited at Physiotherapy Department of Hospital Fernando Fonseca within the first month after stroke. N=8 (all male)
Mean age 62,5±6,2y, with unilateral stroke (7 ischemic, 1 hemorrhagic) middle cerebral artery territory
Time since stroke: 15±7 days

Inclusion criteria
Single unilateral stroke in the middle cerebral artery territory
No cognitive impairment according to MiniMental State
No cardiacl complications
No lower limb orthopedic problems
No other diseases that could interfere with balance
Inform consent to participate in the study

Methods
The test protocol includes assessment of strength, balance and functionality.
Knee muscle strength (extensors and flexors) was measured on the isokinetic dynamometer, Cybex 6000 TD.
Balance was assessed with the Berg Balance Scale (BBS)
Functional independence was assessed with the Modified Barthel Index (MBI).
The results were analyzed at the SPSS program version 17.0.
Descriptive statistics were used to characterize the participants. A correlation analysis was performed using knee muscle strength, BBS and MBI. The significance level was set at p < 0.05.

Results

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
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<tbody>
<tr>
<td>MBI</td>
<td>8</td>
<td>33</td>
<td>86</td>
<td>65.63</td>
<td>17.329</td>
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<tr>
<td>BBS</td>
<td>8</td>
<td>6</td>
<td>44</td>
<td>29.63</td>
<td>14.813</td>
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<tr>
<td>FAS</td>
<td>8</td>
<td>28</td>
<td>75</td>
<td>47.63</td>
<td>17.856</td>
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<tr>
<td>FNAS</td>
<td>8</td>
<td>60</td>
<td>103</td>
<td>76.00</td>
<td>15.510</td>
</tr>
<tr>
<td>EAS</td>
<td>8</td>
<td>43</td>
<td>119</td>
<td>87.13</td>
<td>22.592</td>
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<tr>
<td>ENAS</td>
<td>8</td>
<td>65</td>
<td>134</td>
<td>113.25</td>
<td>20.810</td>
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**Ratio Statistics for Flexors affected side / non affected side**

<table>
<thead>
<tr>
<th>Price Related Differential</th>
<th>1.024</th>
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<tbody>
<tr>
<td>Coefficient of Dispersion</td>
<td>.269</td>
</tr>
<tr>
<td>Coefficient of Variation</td>
<td>34.5%</td>
</tr>
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</table>

Knee flexors from the affected lower limb show a deficit of 34.5% regarding knee flexors from non affected lower limb

**Ratio Statistics for Extensors affected side / non affected side**

<table>
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<tbody>
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<td>Coefficient of Dispersion</td>
<td>.172</td>
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<tr>
<td>Coefficient of Variation</td>
<td>26.6%</td>
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</tbody>
</table>

Knee extensors from the affected lower limb show a deficit of 26.6% regarding knee extensors from non affected lower limb

Discussion & Conclusions
After stroke knee strength from the affected lower limb is impaired. It appears to be important to improve knee muscle strength from the affected lower limb to reduce weakness. In addition persons with stroke have higher risk of falls and are functionally dependent. There is evidence that balance is an important feature for functional independence in persons with stroke.

Recommendations
Further research is needed to investigate the effect of knee muscle strength training on balance and function. These results indicate that early physiotherapy is needed after stroke. Intervention must focus on strength and balance training in order to improve stability and help patients with stroke to become functionally independent.

References

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Contact details
Beatriz Fernandes
beatriz.fernandes@estelis.ipl.pt